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Emotional Climate and Behavioral Management during Sleep Time in Early Childhood Education Settings

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ABSTRACT

The majority of children cease napping between 3 and 5 years of age yet, internationally, the allocation of a sleep time during the day for children of this age remains a practice in many early childhood education (ECE) settings. These dual circumstances present a disjuncture between children's sleep needs and center practices, that may cause conflict for staff, increase stress for children and escalate negative emotional climate in the room. Testing this hypothesis requires observation of both the emotional climate and behavioral management used in ECE rooms that extends into the sleep time. This study was the first to apply the Classroom Assessment and Scoring System (CLASS) Pre-K (Pianta, La Paro, & Hamre, 2008) to observe the emotional climate and behavioral management during sleep time. Pilot results indicated that the CLASS Pre-K functioned reliably to measure emotional climate and behavioral management in sleep time. However, new sleep-specific examples of the dimensions used were developed, to help orient fieldworkers to the CLASS Pre-K rating system in the sleep time context. The CLASS was then used to assess emotional climate and behavior management between the non-sleep and sleep time sessions, in 113 ECE rooms in Queensland, Australia. In these rooms 2.114 children were observed. Of these children, 71% did not sleep at any point during the allotted sleep times. There was a significant drop in emotional climate and behavioral management between the non-sleep and sleep-time sessions. Furthermore, the duration of mandated sleep time (a period of time where no activities are provided to non-sleeping children) accounted for significant independent variance in the observed emotional climate during sleep-time. The CLASS Pre-K presents a valuable tool to assess the emotional climate and behavior management during sleep-time and draws attention to the need for further studies of sleep time in ECE settings.

The quality and duration of sleep affects how individuals think, feel and behave. It is therefore not surprising that disruption to normal sleep patterns has been found to have numerous adverse social and health consequences (Carskadon & Dement, 1994; Vassalli & Dijk, 2009). A growing body of evidence attests to the importance of sleep in childhood, with a multitude of adverse social, cognitive, and health outcomes being linked to sleep loss or disruption. Specifically, sleep loss/disruption has been associated with an increased risk of childhood obesity (Bell & Zimmerman, 2010; Jiang et al., 2009), poorer neurocognitive functioning and academic performance in children and adolescents (Sadeh, 2007; Touchette et al., 2007). Much of this evidence derives from studies of sleep at night; the role of daytime sleep is not well understood. During the first three years of life, daytime sleep is a typical behavior that has a clear developmental function (Acebo et al., 2005; Iglowstein, Jenni, Molinari, & Largo, 2003; Weissbluth, 1995). Beyond these years, daytime sleep may only be beneficial in circumstances of deprivation or restriction of night-time sleep (Batejat & Lagarde, 1999; Crosby, LeBourgeois, & Harsh, 2005; Fallone, Acebo, Arnedt, Seifer, & Carskadon, 2001). The body of extant findings directs attention to practices in early childhood education (ECE) environments, across a range of international settings, where mandating sleep periods for all children occurs well beyond the age at which daytime sleep may be a biological necessity (El-Sheikh, Arsiwalla, Staton, Dyer, & Vaughn, 2013; Fukuda & Sakashita, 2002; Ward, Gay, Alkon, Anders, & Lee, 2008; Watamura, Sebanc, & Gunnar, 2002). Potential implications of such practices include: increasing conflict between children

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who do not sleep and their supervising care staff, raising stress for the children who no longer need/want to sleep, and non-sleeping children disrupting children who require day-sleep. The current study was conducted to address these possibilities. The interactions within a range of Australian ECE rooms were observed during the non-sleep and sleep time sessions, on one day, using the Classroom Assessment and Scoring System (CLASS) Pre-K (Pianta, La Paro, & Hamre, 2008). The CLASS Pre-K ratings assessed the impact of variation in duration of mandated sleep time and the level of continuity of emotional climate and behavioral management across non-sleep and sleep time sessions. In the current study, the term *sleep time* is used in reference to naptime, rest time, or daytime sleep as this is common usage in the Australian ECE context.

The need to assess emotional climate and behavioral management during sleep time

Across the first 4 years of life, human sleep–wake cycles evidence a rapid developmental transition from polyphasic sleep–wake patterns in infancy (where a child sleeps multiple times throughout the day and night), to predominantly biphasic patterns (nap only once during the day) in toddlerhood through to mature monophasic (where sleep is consolidated into the night period) sleep–wake cycles (Acebo et al., 2005; Iglowstein et al., 2003; Weissbluth, 1995). By age 4, most children have achieved monophasic sleep patterns (Acebo et al., 2005; Blair et al., 2012; Iglowstein et al., 2003), yet the scheduling of sleep time for children of this age is a feature of many ECE settings.

Currently, data from Australia indicates that daily programming in ECE settings includes scheduling for sleep time which exceeds 2 h, with these periods often mandated for all children until school entry at age 6 (Staton, Smith, Pattinson, & Thorpe, 2013). Internationally, information on daytime sleep practices in ECE settings is not well documented. However, there is evidence that mandated sleep time occurs in the United States of America (USA) with research methodologies and outcomes documenting extended periods in which children are required to lie without alternative activities (Kurdziel, Duclos, & Spencer, 2013; Ward, Gay, Alkon et al., 2008; Ward, Gay, Anders, Alkon, & Lee, 2008; Watamura et al., 2002). For example, Ward, Gay, Anders, et al. (2008) documented a mandated sleep period of two and a half hours for all children aged between 2.5 and 4.9 years in two university affiliated full-day child care centers. Additionally, Watamura and colleagues (2002) observed children aged between 2.8 and 4.3 years in a university-based full day childcare center in the Midwest. They documented that rest time consisted of two parts, an initial 50-min period during which all children were required to lie on their cots only, followed by an optional rest period during which those children not sleeping, were provided activities in another room. Thus, a maximum total sleep period of 2.5 h was documented. More recently, Kurdziel et al. (2013) observed 77 children (aged between 3 and 5.5 years) in six preschool classrooms with a scheduled classroom nap time of approximately 2 h. Although these studies are limited to small and selected samples, they suggest that practices of sleep scheduling in ECE are not unique to Australian contexts. Furthermore, studies from Japan indicate that there is a national mandated sleep time of 1.5 h for all children attending nursery schools aged between 2 and 5 years (Fukuda & Sakashita, 2002; Komada et al., 2012).

The scheduling of sleep time for all children, when for most sleep is no longer biologically required (Acebo et al., 2005; Iglowstein et al., 2003), raises the possibility of two disruptive and potentially detrimental mechanisms. First, for children who sleep during the ECE day, there may be a reduction in the homeostatic sleep drive such that night-time sleep is affected (Fukuda & Asaoka, 2004; Fukuda & Sakashita, 2002). The net benefit of a sleep time may only pertain for children who have insufficient night sleep at home (Kelly & El-Sheikh, 2011), or who have not yet ceased to require additional sleep during the day in accordance with individual difference in normative patterns of sleep development (Acebo et al., 2005). Second, for those children who cannot sleep, the experience may be stressful, particularly in circumstances where alternative activities are not permitted (Ward, Gay, Alkon et al., 2008). In the absence of alternative activities, children unable to sleep may transgress behavioral expectations, be viewed as behaviorally difficult by staff and therefore be reprimanded, or experience stress. Mandating sleep time for children who do not sleep may also present an issue of behavioral management. Difficulties arise when the rights of those to have an appropriately quiet environment for those who sleep, is pitched against the management of children who do not require sleep. To test both the biological (homeostatic drive) and behavioral hypotheses requires observation of the emotional quality of the environment in the ECE classroom alongside the behavioral management strategies used during sleep time.

Although the implications of mandating a sleep time in ECE services on children's sleep patterns are currently unknown, emerging evidence suggests that napping in pre-school classrooms may have disruptive effects on night-time sleep that endure beyond napping cessation. Fukuda and Sakashita (2002) compared the sleep patterns of children attending *kindergarten programs*, where napping was optional, with those of children attending *nursery programs*, where all children were required to nap for 1.5 h daily. The authors reported that children attending nursery programs, with mandated sleep periods, had significantly later bed-times, delayed sleep onset, shorter night-time sleep and more unwillingness to attend the program, than those children for whom sleep was optional. A follow-up study found that the sleep difficulties experienced by children attending nursery programs continued into their elementary school years, long after their afternoon nap routine had ceased (Fukuda & Asaoka, 2004). Two further studies of preschool children (Acebo et al., 2005; Ward, Gay, Anders et al., 2008), found that napping was associated with poorer night time sleep and more night awakenings. Furthermore, Lam, Mahone, Mason, and Scharf (2011) found that daytime napping in preschoolers was negatively correlated with performance on neurocognitive testing. The designs of these studies do not allow the direction of effect between disruption of night sleep and daytime napping to be fully understood. To date, only the studies of Fukuda and colleagues (Fukuda & Asaoka, 2004; Fukuda & Sakashita, 2002) present any data on direction of association, suggesting that napping under the mandated conditions of the ECE setting precedes long-term sleep disruption. The possibility that a third factor explains the associations must also be considered. For example, poor health or stressful life circumstances may drive both sleep disruption and poor cognitive functioning. The available studies indicate the need for more knowledge of such underlying mechanisms.

Sleep time in ECE rooms for 3- to 5-year-olds has the potential to present emotional and behavioral challenges both for children and their supervising teachers. Currently, there are no studies that have examined this hypothesis; however, two studies have provided indirect evidence for increased stress. Ward, Gay, Alkon et al. (2008) provided preliminary evidence for this hypothesis, with 50% of children ($n = 38$) observed during sleep time at childcare classified as '*problem nappers*' (children exhibited disruptive behavior or difficulty settling, requiring teacher assistance). Compared to non-problem nappers, problem nappers had significantly higher levels of cortisol directly following the sleep period. This finding may indicate raised stress associated with an unwanted experience. Additionally, evidence from children's accounts of childcare suggests that naptime is a disliked and unwanted experience for many 4-year-olds. In a study of children's accounts of their

experiences in childcare, naptime was named among the top three unwanted experiences alongside "mean children" and" long circle times" (Wiltz & Klein, 2001). To assess whether such responses relate to the experience of sleep time requires not only an assessment of those who sleep, but also of the experiences of those who remain awake. In particular, documentation of the emotional quality of interactions between children and supervising care staff, and the behavioral management strategies used during the sleep period, is necessary. Further, using measures that allow assessment of the degree of continuity or discontinuity from the emotional climate and behavioral management experienced during all activities throughout the day allows assessment of the independent impact of these factors during sleep time. To this end, identification of a measure suitable for assessment of emotional climate and behavior management within sleep time and during the non-sleep time sessions is required.

Questionnaires and interviews have been used extensively to report on children's sleep behavior (Crosby et al., 2005; Hale, Berger, LeBourgeois, & Brooks-Gunn, 2011). However, such measures, while functioning well to report on behavioral aspects of sleep and/or sleep time, are not designed for assessment of emotional climate. Moreover, these measures do not provide opportunity for comparison with general classroom interactions and emotional climate. For this task, an independent measure of classroom environment using standardized codes provides the best option. Among the most comprehensive measures of emotional climate in pre-kindergarten class environments is the Classroom Assessment and Scoring System (CLASS) Pre-K (Pianta et al., 2008). The CLASS is used extensively to rate ECE teacher–child interaction quality and has been used as a measure of Head Start program quality (Howes et al., 2008; Paro, Pianta, & Stuhlman, 2004; LoCasale-Crouch et al., 2007; Merritt, Wanless, Rimm-Kaufman, Cameron, & Peugh, 2012; Raver et al., 2008). Within the standard CLASS protocol observations are not made in sleep time, but rather cease at the transition to the scheduled sleep period. However, the coding framework presents categories that do not preclude application during sleep time. As the focus of this study was to examine the trajectories of emotional climate and behavioral management throughout sleep and non-sleep sessions, these subscales of the CLASS Pre-K were identified as a focus. The first aim of this study was to report on the efficacy of the CLASS Pre-K scales as an observational assessment of sleep time.

Assessing the impact of sleep practices in ECE settings on emotional climate and behavioral management in the Australian Context

In the current study, two types of ECE services were observed in Queensland, Australia. These were Long-day care and Kindergarten programs. Long-day care is equivalent to '*child care*' centers in the USA, providing center-based care for children from birth until school entry (5- to 6-years old). These services are run by not-for-profit and for-profit organizations that operate at least 48 weeks per year, open for approximately 10-h per day and provide full-time or part-time care with children grouped in rooms according to developmental stage or age (Queensland Department of Education & Training, 2013). For example, a Long-day care center may have 4 rooms based on age groups: "Infants": 0- to 15-months, "Toddlers": 15-months to 2-years, "Kindy" 2- to 3-years and "Preschool": 3- to 5-years. Kindergartens are akin to USA '*preschool*' programs. Queensland Kindergarten programs provide care to children in the year before school entry with the majority of the children in these programs being aged between 3- and 5-years. Children typically attend for 15 h per week and programs are commonly scheduled as a 5-day fortnight: 2 days one week, then 3 days the following week, with programs running for approximately 40 weeks of the year (C&K Pre-schooling Professionals, 2013). Recently, Tayler, Ishimine, Cloney, Cleveland, and Thorpe (2013) completed a comparison of Kindergarten programs in Australia and preschool programs in the USA using the CLASS Pre-K (Pianta et al., 2008). Ratings of emotional climate were reported to be equivalent between Australian Kindergarten programs and USA preschool programs (Tayler et al., 2013).

Currently, over one million (60%) Australian children attend licensed care services (Australian Bureau of Statistics, 2012; Karvelas, 2013). In Australia, national quality standards (Australian Children's Education & Care Quality Authority, 2011) and curriculum documents (Council of Australian Governments, 2009a) direct ECE services to adopt child-centered approaches to learning and social-constructivist approaches in interactions. However, data emerging from a large Australian study (Effective Early Educational Experiences for Children; E4Kids) indicates that more than three-quarters of ECE services have compulsory sleep periods, in which all children are required to lie quietly without alternative activities even if they do not or cannot sleep (Staton, Smith et al., 2013). This suggests that, for those children who have achieved mature monophasic sleep patterns, the experience of scheduled sleep time may not be developmentally appropriate. Within the remaining quarter of ECE services, there were varying degrees of flexibility in practices during sleep time, for example, allowing sleep time to be optional or permitting children choice of a quiet activity. To date, there are no studies that report on the effect of these practices. Furthermore, there are currently no national guidelines regarding sleep practices and policies for ECE providers. Factors such as provisions for staff planning, cleaning, breaks, and beliefs about child sleep needs may influence the scheduling of sleep within these services (Inglis, Staton, Smith, Pattinson, & Thorpe, 2013). This staff/center based scheduling of sleep ostensibly runs contrary to recent research of effective ECE environments that indicates that when teachers co-create and negotiate activities with children there is an associated increase in child engagement, behavior, and overall positive emotional climate (Council of Australian Governments, 2009b; Hicks & Holden, 2007; Mashburn & Pianta, 2006).

Existing evidence documents that the majority of children in Australian pre-school rooms will not sleep during the allotted sleep period (Staton, Smith et al., 2013). Accordingly, two hypotheses, regarding the impact of sleep time on the emotional climate and behavioral management within ECE rooms are proposed. First, a disjuncture between scheduling of sleep and a child's ability to sleep is likely to have implications for emotional climate and behavioral management through increased violation of behavioral expectations and escalation of negative emotional climate (e.g. yelling and threats to establish control). This hypothesis would predict that ratings of emotional climate and behavioral management would decline between the non-sleep and sleep time sessions. The second hypothesis is that there would be significant declines in emotional climate and behavioral management associated with increased duration of mandated sleep time, defined as the duration of time in which all children were required to lie on their beds without any activities (e.g. quiet reading) permitted for non-sleeping children.

In response to the hypothesized need for assessment of emotional climate and behavior management during sleep time in ECE classrooms, we assessed the use of the CLASS Pre-K observation measure in this context. We initially piloted the CLASS Pre-K for use during sleep time. We then employed the CLASS Pre-K to examine the effect of sleep time on emotional climate and behavior management, by comparing mean CLASS scores during non-sleep and sleep time sessions. Finally, we examined the effect of the duration of mandated sleep on ratings of emotional climate and behavioral

management during sleep time whilst controlling for the ratings of emotional climate and behavioral management in the non-sleep context and the proportion of children that were asleep during the sleep-time session.

Method

Pilot study

Participants

Pilot testing was undertaken to assess the effectiveness of the CLASS Pre-K (Pianta et al., 2008) to measure emotional climate and behavioral management in the context of sleep time. This pilot testing was conducted in three rooms located within three ECE services independent of any centers involved in the subsequent sleep observation study reported in this paper. Children attending the three pilot rooms were aged between 3- and 6-years.

Procedure

Seven CLASS certified researchers undertook observations. All had undertaken three days of training by certified CLASS Pre-K instructors and achieved over 80% agreement, within 1 scale point, of the master coders across five video-assessments administered by *Teachstone* (http://www.teachstone.com/about-the-class/). Each researcher was asked to evaluate the efficacy of the CLASS Pre-K protocol in capturing the interactions occurring within the context of sleep time and to report back any possible modifications needed.

The protocol established for the piloting process is similar to the standard CLASS Pre-K protocol, with observations being conducted in 30-min cycles. However, the sleep observation protocol incorporated a timed cycle of 25 min of observation and 5 min of coding. This adjustment to timing of the observation cycles ensured that variations in sleep practices and durations across all rooms were captured. Furthermore, due to the use of a shortened version of the CLASS Pre-K coding system, a shortened, 5-min coding period was used. Thus, for a sleep time of 30-min duration, observers completed one, 30-min observation cycle and for a 2-h sleep time, observers completed four, 30-min observation cycles. Sleep observations commenced when the first child got onto their bed and were completed once the last child had left their bed. Five dimensions of the CLASS Pre-K (Pianta et al., 2008) were used to measure the observed teacher–child interactions that impact on the emotional and behavioral aspects of the sleep period. Four dimensions comprising the Emotional Climate domain and one dimension of the Organizational Support domain were measured. The Emotional Climate dimensions were: *Positive Climate* (assesses emotional connectedness and the level of respect and enjoyment shown between students and teachers as well as within peer interactions), *Negative Climate* (assess the degree of negativity expressed by teachers and/or children), *Teacher Sensitivity* (responsiveness of teachers to children's academic and emotional development), and *Regard for Student Perspectives* (the degree to which classroom activities reflect students' interests and ideas). One dimension of the Organizational Support domain *Behavioral Management* (the effectiveness of teacher strategies to prevent and redirect misbehavior) was measured.

Initial feedback from the seven experienced researchers identified a difficulty with the application of CLASS Pre-K to the context of sleep time. Even though all researchers had extensive experience using the CLASS Pre-K measure in its standard form, there was a tendency to modify their point of references when coding the CLASS in the context of sleep time. During the sleep observations, researchers made adjustments to the CLASS definitions to account for their belief that sleep time necessitated a more structured part of children's ECE experiences. That is, there was a level of personal bias and subjectivity not previously seen when administering the CLASS in the standard non-sleep observations. In response to this feedback, and consistent with the original CLASS measure, sleep time specific examples were developed. These examples, presented in Appendix Tables A through E (Online Supplementary Material), were not used as definitive examples to base coding, but were developed to orient observers to the published CLASS definitions. After piloting the measurement, all fieldworkers were subsequently trained in the sleep time observation protocol, using the additional sleep time specific examples to ensure integrity of the CLASS categories was maintained.

Primary study

Participating Centers

The centers recruited for this study were those ECE services with children participating in the second year (2011) of the Effective Early Educational Experiences for Children (E4Kids) study in Queensland, Australia (Tayler et al., 2013). In 2010, the E4Kids study applied a stratified random sampling frame to recruit licensed ECE services in two metropolitan, a regional, and a remote location across Queensland and Victoria. In Queensland, the metropolitan site of Brisbane, and the remote location of Mt Isa were the recruitment sites for the study; in Victoria, the recruitment sites were Melbourne (metropolitan) and Shepparton (regional). The study aimed to represent the diversity of licensed ECE provisions in Australia (Tayler et al., 2013). In Queensland, while the majority of children participating in the E4Kids study commenced school in 2011, approximately 22% ($n = 245$) remained engaged in ECE services. A total of 111 (97%) ECE services were recruited, this included, 72 Long-day care services and 39 Kindergarten services. Within these services there were 130 ECE rooms that were attended by children participating in the E4Kids study in 2011.

Participating Rooms

To account for developmental changes in sleep and ensure age comparability, only rooms that had children in attendance, aged 4.5 years (the year prior to school) at the time of observation, were included in the current study. As a consequence, five rooms were excluded. The excluded rooms included two rooms with all children aged less than 4.5 years at the time of observation (i.e. two years prior to school entry), one multi-age room that included children younger than 20 months, and two rooms that, due to observations being conducted during school holiday care periods, included school-aged children. A further 12 (9.6%) rooms were excluded because they did not have a scheduled sleep period. Thus, a final sample of 113 rooms was observed during both the non-sleep and sleep time sessions. These rooms were nested within 98 ECE services ($n = 66$ Long-day care services and $n = 32$ Kindergarten services). Ten centers (10%) had more than one room in the analysis. To examine the similarity of sleep practices, emotional climate and behavioral management (during both sleep and non-sleep sessions) between individual rooms within a single center, a series of intra-class correlations were conducted. In all cases the intra-class correlation coefficients were low to moderate (from .02 for non-sleep behavioral management ratings to .36 for duration of mandated sleep time).

Scheduled sleep time across all rooms ranged from 30 min to 180 min (3 h), with a mean of 83.54 min. The modal scheduled sleep time (34 rooms; 30.1%) was 120 min (2 h). Scheduled sleep times varied with 26.5% of rooms scheduling less than 1 h for sleep time, 37.2% scheduled between 1 h and less than 2 h, and 36.3% had a standard scheduled sleep time of 2 or more hours.

Participating Children and Staff

Within the 113 rooms observed, the number of children present on the day of observations ranged from 9 to 26 ($M = 18.71$,

Mode = 21). A total of 2.114 children were observed across the day and during sleep time. The average age of the youngest child across these rooms was 48 months (4 years; *SD* = 4.2 months) and the average oldest child was 62 months (5.16 years; *SD* = 2.6 months). Across all rooms, the age range observed was 3.0–6.4 years. Quality standard regulations in the State of Queensland in 2011 required a staff to child ratio of 1:12. Therefore, most rooms required 2 adult carers, with at least one carer being present at all times during the observations.

Measures

The CLASS Pre-K *(Pianta et al., 2008)*

Embedded in the theory of effective teaching as an educational science, this measure observes classroom experiences in three distinct domains: Emotional Climate, Classroom Organization, and Instructional Support (Hamre, Pianta, Mashburn, & Downer, 2007). For this study, a subset of five dimensions (four dimensions of the Emotional Climate domain and the Behavioral Management dimension) of the CLASS Pre-K (Pianta et al., 2008) was used. Each dimension is rated on a seven-point Likert scale with ranges of Low (1, 2), Mid (3, 4, 5) and High (6, 7). In all rooms, the CLASS Pre-K (Pianta et al., 2008) was used to observe the teacher–child interactions, across all activities throughout the day. Activities observed included, meals and snacks, transitions between activities, free-play and the sleep time session. During the sleep period, researchers were also provided the sleep-specific examples (Appendix Tables A through E, Online Supplementary Material) to help orient them to the CLASS Pre-K coding system in the context of sleep.

Sleep Observation Protocol

The *mandated sleep time* was defined as the observed time (minutes) within the scheduled sleep time that all children were required to lie on beds only, without any alternative activities permitted. Mandated sleep time ranged from 0 min (no time during the scheduled sleep time was spent without alternative activities being provided) to 140 min, during which, non-sleeping children were not permitted any alternative activities (*M* = 57.80 min, *SD* = 36.96 min). A count of the number of children in the room who were *awake* (eyes open and/or moving), *asleep* (eyes closed and lying still) and *potentially asleep* (lying still but unable to see child's eyes), was also conducted using a modified version of the Nap Observation Protocol employed by Ward, Gay, Alkon, et al. (2008). This method of observation has been found to have good reliability against objective ambulatory assessment of sleep/wake patterns using actigraphy devices (ICC > 94) (Staton, Pattinson, Smith, & Thorpe, 2013; Ward, Gay, Alkon, et al., 2008). To provide a singular and conservative estimate of the children asleep for analysis, the maximum number of children coded as *asleep* and *potentially asleep* in each room were combined and expressed as a proportion (%) of the number of children within a room.

Procedure

Permission to conduct this research was obtained through the University Human Ethics Research Committee and written consent was provided by the service director and teachers to undertake observations within the participating classrooms. The CLASS Pre-K (Pianta et al., 2008) observation was undertaken throughout one day in each center. The commencement of observations was arranged with reference to the daily schedule and in consultation with supervising care staff. All observations were conducted by trained researchers who were certified as reliable in using the CLASS Pre-K measure. The majority of observations commenced between 8:30 am and 9:00 am and finished at the end of sleep time. A minimum of four and maximum of six observation cycles of the CLASS Pre-K were completed in the non-sleep sessions. Consistent with instructions of the CLASS manual, observation cycles during non-sleep sessions, comprised of 15 to 20 min observations of the classroom interactions and up to 10 min of coding (Pianta et al., 2008). Observations of sleep time (using the observation protocol outlined in the Pilot Study, p. 12) commenced once the first child was on their bed and ended when the last child left their bed. In addition, the *Sleep Observation Protocol* was conducted every 10 min. Inter-rater reliability testing was also undertaken. This was conducted in eight rooms. Eight coders each rated one room, during the scheduled sleep period, alongside the gold standard coder. Inter-rater reliabilities were calculated for each individual using the standard CLASS criteria. Following published CLASS protocol, certified reliability was expressed as being within one rating of the Gold Standard Coder, with at least 80% agreement across all observations. Inter-rater reliability with eight fieldworkers yielded high levels of reliability against the gold standard coder (*M* = 98.8%, range: 83.3–100%).

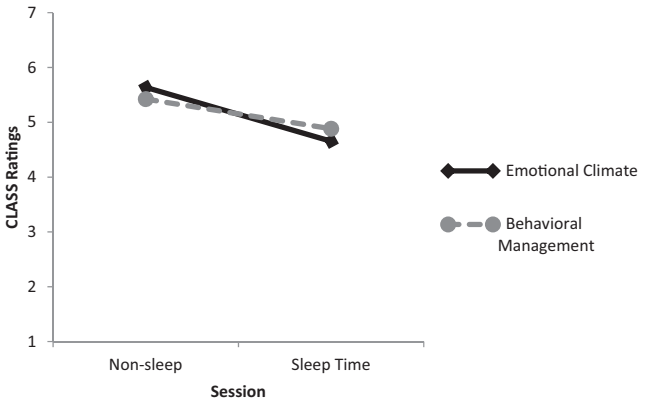

Fig. 1. Ratings of mean emotional climate and behavior management between non-sleep and sleep-time sessions.

Results

Children's Observed Sleep Behaviors

Of the 2.114 children observed, 1.496 (71%) did not sleep at any point during the scheduled sleep period. The maximum proportion of children observed sleeping within a room ranged from 0 to 90% with a mean of 30.84%.

Ratings of Emotional Climate and Behavioral Management between Sessions

A significant decline in ratings of emotional climate between the non-sleep and sleep-time sessions, was found, using a paired-samples *t* test, $t(112) = 15.93$, $p < .001$, *95% CI* [.86, 1.11], $d = 1.50$. A significant decline in ratings of behavioral management between the non-sleep and sleep-time sessions, was found using a paired-samples *t* test, $t(112) = 6.68$, $p < .001$, *95% CI* [.38, .70], $d = .63$. Declines in emotional climate and behavioral management across sessions are illustrated in Fig. 1.

Correlations between emotional climate, behavioral management and mandated sleep time

Correlations between the key variables are presented in Table 1. Emotional climate ratings of the sleep-time sessions were moderately associated with emotional climate ratings during non-sleep sessions, maximum proportion of children asleep, and duration

Table 1
Descriptive Statistics and Correlations between Key Variables and Duration of Mandated Sleep (DMS) and with Proportion of Children Asleep during Sleep-time (%asleep).

Variable	Session	*M (SD)*	*r* (with DMS)	*r %asleep*	*t*	*r*
Positive Climate	Non-sleep	5.47 (.82)	−.413***		11.13***	.600***
	Sleep time	4.60 (1.00)	−.335***	−.19*		
Negative Climate[a]	Non-sleep	6.66 (.61)	−.391***		4.65***	.702***
	Sleep time	6.41 (.79)	−.459***	−.18		
Teacher Sensitivity	Non-sleep	5.27 (1.07)	−.353***		8.42***	.721***
	Sleep time	4.55 (1.29)	−.284**	−.15		
Regard for Student Perspectives	Non-sleep	5.16 (.78)	−.240*		19.41***	.158†
	Sleep time	3.04 (.99)	−.429***	−.32**		
Emotional Climate[a]	Non-sleep	5.64 (.70)	−.408***		15.93***	.693***
	Sleep time	4.66 (.78)	−.467***	−.26*		
Behavioral Management	Non-sleep	5.42 (.97)	−.235*		6.68***	.615***
	Sleep time	4.88 (1.17)	−.267**	−.01		

* $p < .05$.
** $p < .01$.
*** $p < .001$.
† $p < .10$.
[a] Negative climate is reverse coded so that higher scores indicate lower levels of negative climate.

of mandated sleep time. Behavior management ratings of the sleep time sessions were moderately associated with the behavior management ratings during non-sleep sessions and duration of mandated sleep time. However, behavior management during sleep-time was not significantly associated with the maximum proportion of children asleep.

Mandated Sleep Time on Ratings of Emotional Climate and Behavioral Management

To address the hypothesis that duration of mandated sleep time would be negatively associated with emotional climate of sleep time, a hierarchical multiple regression analysis was conducted. Only variables identified as having a significant bivariate association with the DV were included in the analysis. At Step 1 (see Table 2), the emotional climate ratings of the non-sleep session and the proportion of children who were asleep was entered. At Step 2, duration of mandated sleep time (in minutes) was entered. Assumptions of the multiple regression analysis were examined and no breaches were identified.

As shown in Table 2, in Step 1, 39% of the variance in the emotional climate of the sleep time session was accounted for by the emotional climate of the non-sleep session and the proportion of children asleep, ($F(2,110) = 35.08$, $p < .001$). The addition of duration of mandated sleep time, entered at Step 2, accounted for an additional and significant, 4.9% of the variance in the emotional climate of sleep time ($F(3,109) = 28.36$, $p < .001$). Both emotional climate of the non-sleep session and the amount of mandated sleep time were significantly associated with the emotional climate of sleep time. There was no association between the number of children asleep in this period and emotional climate observed during sleep time at both steps of this model. The total model accounted for 42.3% of the variance in the emotional climate observed during sleep time.

To address the hypothesis that the duration of mandated sleep time would be negatively associated with behavioral management in sleep time, a hierarchical multiple regression analysis was conducted. As there was no significant bivariate association between the proportion of children asleep and behavior management ratings during sleep time analyses were conducted with and without this variable. As there were minimal differences in the results, the subsequent analysis does not include the proportion of children asleep. In Step 1 (see Table 2), the behavioral management rating of the non-sleep session was entered. At Step 2, duration of mandated sleep time (in minutes) was entered. All of the assumptions of the multiple regression analysis were met.

As shown in Table 2, in Step 1, 48% of the variance of behavioral management ratings during sleep time was accounted for by the behavioral management ratings of non-sleep sessions ($F(2,110) = 102.36$, $p < .001$). The addition of duration of mandated sleep time at Step 2, accounted for an additional 1.2% of the variance in the behavior management of sleep time, representing a non-significant change. Table 2 shows that in Step 2, only the behavioral management ratings of the non-sleep session were significantly associated with the observed behavioral management of sleep time.

Table 2
Predictors of Emotional Climate and Behavioral Management Ratings during Sleep Time using Hierarchical Regression ($N = 113$ rooms).

Predictors	ΔR^2	*b (SE)*	*β*
(a) Emotional Climate[a] During Sleep Time			
Step 1	.39**		
Emotional climate during the non-sleep session[a]		.69 (.08)	.62**
Maximum proportion of children asleep		−.35 (.24)	−.11
Step 2	.05*		
Emotional climate during the non-sleep session[a]		.57 (.09)	.51**
Maximum proportion of children asleep		.28 (.31)	.09
Duration of mandated sleep time		−.01 (.00)	−.26*
(b) Behavioral Management During Sleep Time			
Step 1	.48**		
Behavioral management during the non-sleep session		.83 (.08)	.69**
Step 2	.01		
Behavioral management during the non-sleep session		.80 (.08)	.67**
Duration of mandated sleep time		−.00 (.00)	−.11

* $p < .01$.
** $p < .001$.
[a] Negative climate is reverse coded so that higher scores indicate lower levels of negative climate.

The total model accounted for 49.1% of the variance in the behavioral management observed during sleep time.

Finally, to ensure that we did not over-estimate the observed emotional climate and behavioral management by including multiple rooms from a single center, analyses were also conducted with only one room randomly selected from each center included. No substantial differences in results were found. Accordingly, the results presented, included all rooms in the analysis.

Discussion

Biological studies indicate that between 3- and 5-years, a majority of children enter a monophasic sleep pattern and cease to require a daytime nap (Acebo et al., 2005; Iglowstein et al., 2003). However, internationally, ECE settings continue to schedule sleep for children of this age (Fukuda & Sakashita, 2002; Staton, Smith et al., 2013; Ward, Gay, Alkon, et al., 2008). This circumstance presents the potential for daily difficulties with behavioral management and attendant reduction in the classroom's emotional climate. The current study proposed that sleep time may be disruptive for children and their supervising care staff. As this was the first study to use the CLASS Pre-K (Pianta et al., 2008) in the context of sleep time, a pilot study was conducted. The pilot study trialed the use of a subset of the CLASS Pre-K observation protocol during the sleep period. The measure was then employed to assess changes in emotional climate and behavioral management between sleep and non-sleep sessions throughout one day in 113 ECE services in Queensland, Australia.

The pilot study indicated that the CLASS Pre-K functioned reliably to assess emotional climate and behavioral management during sleep time, though the measure had not been specifically designed for this purpose and no previous study had reported the use of CLASS in this context. The provision of specific examples for sleep time that remained true to the integrity of the original CLASS dimensions assisted researchers to maintain category integrity.

Consistent with biological research suggesting children beyond three years of age enter monophasic sleep patterns (Acebo et al., 2005; Iglowstein et al., 2003; Staton, Smith et al., 2013), over two thirds of the children observed, did not sleep during the scheduled sleep time. Our data suggests that there was a decline in both emotional climate and behavioral management across all rooms between the non-sleep and sleep-time sessions supporting our first prediction that the scheduling of sleep time may have adverse effects on emotional climate and behavioral management. Declines were evident across all emotional climate dimensions with significant increases in negative climate observed alongside significant declines in positive climate, teacher sensitivity and regard for student perspectives. Notably, these findings do not suggest a decline in emotional climate associated with a single dimension (e.g. regard for student perspectives) but show a decline across all measures of emotional climate. The result indicates that sleep time in ECE presents emotional challenges in which there is a mismatch between teacher goals and child behavior. The decline in behavioral management at sleep time may suggest that, during non-sleep sessions, teachers employ more proactive strategies, and are more accepting of child behavior than they are during the scheduled sleep time. Alongside, children may be more likely to transgress behavioral expectations during sleep time. The overall declines shown in our data may be indicative of increased stress for both staff and children. Recent research indicates that teacher stress is associated with the emotional climate of the classroom (Friedman-Krauss, Raver, Morris, & Jones, 2014). Furthermore, Ward, Gay, Alkon, et al. (2008) showed that regardless of whether children napped or not, 'problematic nappers' who demonstrated disruptive behaviors and difficulty settling, had higher afternoon cortisol levels, which may be indicative of sleep time being a physiologic stressor.

There was partial support for the second hypothesis that predicted that both emotional climate and behavioral management ratings would decrease with increased duration of mandated sleep time. Duration of mandated sleep time uniquely and negatively predicted ratings of emotional climate during sleep time, even after controlling for the emotional climate ratings during the non-sleep session and the proportion of children asleep. This result indicates that classrooms that had longer mandated sleep time had lower ratings of emotional climate. The regression analysis also indicated that the proportion of children who were asleep did not significantly contribute additional variance to the prediction of the emotional climate observed during the sleep time session. Finally, although there was a significant decline overall in ratings of behavioral management between the non-sleep and sleep time sessions, this effect was not associated with the duration of mandated sleep time. A likely explanation for this finding is that increased behavioral difficulties and attendant teacher management strategies occur throughout the sleep session regardless of the duration of the sleep time and are consequently reflected in low variance between mean scores.

Limitations and Future Directions

The current study is the first application of the CLASS Pre-K measure in the context of sleep time and presents promising results from a substantial number of observations of rooms and children. However, there are a number of limitations that must be considered in application of the findings. These relate to the limitations of the sample and limitations of measurement. First, the findings are currently limited to the context of Australian ECE centers. Replication in other national and cultural contexts is needed to ascertain generalizability of the findings. Extension of investigation to new contexts is important, as the practice of mandating a sleep period for children aged between 3- and 5-years has been reported in a range of international contexts (Fukuda & Sakashita, 2002; Kurdziel et al., 2013; Ward, Gay, Alkon et al., 2008; Watamura et al., 2002). Second, the study was only able to employ room-level demographic data and did not have access to individualized child-level data on age or family social economic status. As younger children are biologically more likely to require a daytime sleep, age variability may affect the number of children observed sleeping (Acebo et al., 2005; Iglowstein et al., 2003). However, as the number of non-sleeping children was high (71%) during the allocated sleep time, there is a low likelihood that our results simply reflect individual variability. As there is some evidence in the extant literature of an association between lower SES and increased difficulties obtaining sufficient night-time sleep (Kelly & El-Sheikh, 2011; Mezick et al., 2008; Moore, Adler, Williams, & Jackson, 2002) the need to account for individual social circumstances is evident. Future studies should obtain data on individual age and family social status variability within ECE rooms alongside children's responses to sleep time.

On the basis of the current findings, there are a number of suggested directions for extending the exploration of the effects of sleep practices in childcare. These relate to assessment of child outcomes and extension of the use of CLASS to assess sleep time. While this study provides evidence of an association between sleep policies during sleep time, emotional climate, and behavior management, child outcomes were not directly measured. Examination of children's behavioral and physiological responses to sleep time, through observation and physiological measurement (e.g. cortisol testing), would strengthen the findings of this study and aid in informing sleep practices and policies in ECE settings more generally. In particular, exploration of the differential effects of sleep time

on those children who do and do not sleep is indicated, and should consider the effects of observed emotional climate and behavioral management. Finally, the study focused on a subset of the CLASS dimensions for the observations during sleep time to accommodate the specific focus of our research. Given that we found so many children did not sleep in the rooms observed, future research might consider the use of the entire CLASS Pre-K observation during both the non-sleep and sleep time sessions.

Implications

The findings of the current study raise serious questions pertaining to the sleep policies and practices employed in ECE environments. However, they do not suggest that sleep periods be completely abolished. Our data indicates that a significant minority of children (~30%) did sleep during the allotted sleep time session. Furthermore it is recognized that sleep scheduling may result from economic pressures within ECE centers and be provided to allow staff breaks, cleaning, time for planning lessons, and professional development (Inglis et al., 2013). Nevertheless, our results indicate that sleep time presents an issue for both emotional climate and behavior management within classrooms. Emotional climate and behavioral management have been shown to predict both classroom engagement and learning (Emmer & Stough, 2001; NICHD ECCRN, 2002; Pianta, Paro, Payne, Cox, & Bradley, 2002). The detected association between activities during non-sleep and sleep time sessions, underlines the significance of the sleep period and highlights the imperative for reflection and open discussion about sleep policies and practices to support teachers and children within this challenging period. For example, ECE services may consider a reduction in the duration of mandated sleep time by providing quiet activities for non-sleeping children. A key message of this study is that research is needed to guide ECE staff in decision-making concerning sleep policy and practices.

Conclusion

This study provides evidence of the value of using the CLASS Pre-K observation protocol in the study of sleep in ECE settings. The CLASS Pre-K tool functioned as an effective and sensitive measure of the emotional climate and behavior management observed in sleep time. The results indicate that sleep time presents measureable, emotional and behavioral challenges for both children and teachers. Furthermore, the disjuncture of duration of mandated sleep time and emotional climate in the later years of ECE, calls into question the responsiveness of sleep practices to the developmental transition and behavioral variation in children's sleep patterns at this time. This study highlights the need for further exploration of the antecedents and consequences of sleep policies and practices in ECE settings.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ecresq.2014.07.009.

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